AMENDMENTS TO THE SPECIFICATION

Please amend the title of the application provided at page 1, line 2, and insert the following replacement title:

CONTROL ~~DEVICE~~ SYSTEM FOR MOBILE BODY

Please replace the paragraph beginning at page 39, line 18, and insert the following rewritten paragraph:

The above expressions 1 to 3 mean that the position of a desired node floor reaction force central point of each node having child nodes (that is, each node that is not a leaf node) is set to a weighted average position of the position of the desired node floor reaction force central points of the child nodes of the node by using a predetermined nonnegative weight. In other words, as shown in Fig. 3(b) and Fig. 7 mentioned above, the desired ~~floor node~~ node floor reaction force central point Qn (n=14,23,1423) of each node having child nodes is set at the internally dividing point of the desired node floor reaction force central points of all the child nodes of the node. Fig. 7 is a diagram showing a relationship between the desired node floor reaction force central points Qn (n=1,2,3,4,14,23,1423) of nodes and the weight Wn (n=1,2,3,4,14,23). Incidentally, L23, L14 and L1423 in Fig. 3(b) denote the lengths of segments Q2Q3, Q1Q4 and Q23Q14, respectively.

Please replace the paragraph beginning at page 46, line 24, and insert the

following rewritten paragraph:

As described above, according to the first reference example, each desired node floor reaction force central point Qn (n=1,2,3,4,14,23,1423), each weight Wn(n=1,2,3,4,14,23) and each desired each node floor reaction force Fn (n=1,2,3,4,14,23,1423) are determined by the desired floor reaction force distributor 102 such that they satisfy the following conditions A) to G).

Please replace the paragraph beginning at page 92, line 6, and insert the following rewritten paragraph:

At this time, the corrected desired ground contact portion floor reaction forces Fn_refmdfd (n=1,2,3,4) may be determined from the desired floor reaction force central points Qn(n=1,2,3,4), the corrected total floor reaction force central points Pmdfd, the corrected desired node floor reaction force central points Q14mdfd and Q23mdfd, and the desired total floor reaction forces Ftotalref of the ground contact portions 10 by the same technique as the technique for determining ~~deciding~~ desired node floor reaction forces from the desired floor reaction force central points (the desired node floor reaction force central points of leaf nodes) Qn(n=1,2,3,4), the desired total floor reaction force central points P, the desired node floor reaction force central points Q14 and Q23, and the desired total floor reaction forces Ftotalref of the ground contact portions 10. In other words, the weights of the nodes are determined according to the aforesaid expressions 1 to 3 from the desired floor reaction force central points Qn(n=1,2,3,4), the corrected total floor reaction force

central points Pmdfd, and the corrected desired node floor reaction force central points Q14mdfd and Q23mdfd of the ground contact portions 10, and the corrected desired ground contact portion floor reaction forces Fn_refmdfd (n=1,2,3,4) may be determined according to the aforesaid expression 4 by using the determined weight.

Please replace the paragraph beginning at page 115, line 5, and insert the following rewritten paragraph:

Subsequently, the processing proceeds to S38 to correct desired ground contact portion position/posture on the basis of the compensating angle determined in S34 and to further correct it on the basis of the deformation compensation amount determined in S36, thereby obtaining the corrected desired ground contact portion position/posture with deformation compensation of each ground contact portion 10. In the first reference example, the corrected desired ground contact portion positions of the ground contact portions 10 are determined on the basis of the compensating angles θ1423, θ14 and θ23 as described above (as explained with reference to the aforesaid Fig. 15 and Fig. 16) by the corrected desired ground contact portion position/posture calculator 114g. Then, the determined corrected desired ground contact portion positions are further corrected by the corrected desired ground contact portion position/posture with deformation compensation calculator 114h on the basis of the aforesaid deformation compensation amount En_cmpn(n=1,2,3,4), as described above, thereby obtaining the corrected desired ground contact portion positions with deformation compensations of the ground contact portions 10.

Please replace the paragraph beginning at page 118, line 18, and insert the following rewritten paragraph:

For the same reason as that described above, in the compliance control, the relationship between a changing rate dθberr/dt of the inclination angle error θberr of the entire robot and an increasing amount ΔM_d of the moment generated in response thereto is also preferably a proportional relationship. If not, it is still preferred that expression 25 given below holds for a certain rotational matrix T and a certain diagonal matrix diag(e,f). Incidentally, T and ~~diag(a,b)~~diag(e,f) are secondary square matrixes.

Please replace the paragraph beginning at page 126, line 1, and insert the following rewritten paragraph:

A desired floor reaction force distributor 102 in the second reference example determines desired node floor reaction force central points, the weights of nodes, and desired node floor reaction forces such that the following conditions A') to ~~F')~~ G') are satisfied, as with the first reference example.

Please replace the paragraph beginning at page 134, line 5, and insert the following rewritten paragraph:

The compensating total floor reaction force moment distributor 114a in the second reference example distributes ~~the aforesaid compensating total floor reaction~~

~~force moment Mdmd~~ the aforesaid compensating total floor reaction force moment Mdmd (Mdmdx, Mdmdy) to a 145236th node compensating floor reaction force moment M145236dmd, a 145th node compensating floor reaction force moment M145dmd, and a 236th node compensating floor reaction force moment M236dmd.

Please replace the paragraph beginning at page 134, line 14, and insert the following rewritten paragraph:

The 145236th node compensating floor reaction force moment ~~M1423dmd~~ M145236dmd is the desired value of the moment to be generated about a desired total floor reaction force central point P (desired ZMP) by the translational force component of the floor reaction force of each ground contact portion 10 generated by manipulating the 145236th compensating angle θ145236 (by rotating the set of the first, the fourth, and the fifth ground contact portions and the set of the second, the third, and the ~~fifth~~ sixth ground contact portions about a desired total floor reaction force central point P(=Q145236) by θ145236).

Please replace the paragraph beginning at page 136, line 22, and insert the following rewritten paragraph:

The existence permissible ranges of Q145mdfd, Q236mdfd, and Pmdfd are set, for example, as shown in Fig. 29(a) in a state wherein all the ground contact portions 10 of the robot 1 of the second reference example are in contact with the ground. More specifically, the existence permissible range of Q145mdfd is the

region on the triangle in the bold line in the figure (the sides of and the region in the triangle), and this is the region set in the triangle, which has the desired node floor reaction force central points Q1, Q4, and Q5 of the child nodes of the 145th node as its apexes, such that it is not excessively close to the boundary of the triangle ~~Q1Q4Q4~~Q1Q4Q5. The existence permissible range of Q236mdfd is similar to the above. Further, the existence permissible range of Pmdfd is the region on the segment in bold line in the figure, and this is the region set on a segment Q145Q236 connecting the desired floor reaction force central points Q145 and Q236 of the child nodes of the 145236th node (root node) such that it is not excessively close to the end points of the segment Q145Q236.

Please replace the paragraph beginning at page 144, line 12, and insert the following rewritten paragraph:

A corrected desired ground contact portion position/posture calculator 114g in the second reference example shown in Fig. 25 corrects the desired ground contact portion position/posture (actually the desired ground contact portion position in the robot shown in Fig. 1) of each ground contact portion 10 so as to obtain corrected desired ground contact portion position/posture. More specifically, referring to Fig. 30 and Fig. 31, the desired floor reaction force central points Q1, Q4, and Q5 of the first, the fourth, and the fifth nodes, respectively, which are the child nodes of the 145th node, are rotationally moved by the 145th node compensating angle θ145 (horizontal vector), the desired floor reaction force central point Q145 of the 145th node being the center of rotation. The Q1, Q4, and Q5 after the rotational

movement are denoted by Q1', Q4', and Q5', respectively. Thus, the 145th node compensating angle θ145 is the manipulated variable for moving the relative relationship among the positions of the desired floor reaction force central points Q1, Q4, and ~~Q4~~ Q5 of the first, the fourth, and the fifth nodes, which are the child nodes of the 145th node, without moving the position of the desired floor reaction force central point Q145 of the 145th node.

Please replace the paragraph beginning at page 154, line 19, and insert the following rewritten paragraph:

The desired n-th ground contact portion floor reaction force central point Qn defined in the hierarchical compliance control explained in the aforesaid first and the second reference examples has been the point set at the central point of an n-th ground contact portion; however, the floor reaction force central point Qn may alternatively be set on the ground contact surface (bottom surface) of the ~~na-th~~ n-th ground contact portion. In this case, in the desired gait, the point on the supposed floor surface that is supposed to be in contact with the desired n-th ground contact portion floor reaction force central point Qn is referred to as "supposed n-th floor contact point Dn."

Please replace the paragraph beginning at page 163, line 12, and insert the following rewritten paragraph:

3) Final desired postures to be followed by an actual robot (corrected desired

ground contact portion positions/postures with deformations compensation) or actual joint displacements or frequency weighted average thereof (weighted average based on a weight having a frequency characteristic).

Please replace the paragraph beginning at page 170, line 8, and insert the following rewritten paragraph:

The hierarchical relativization processing is generally defined as the processing for determining the output values of all nodes relative to the sets of input values (the values of predetermined types of state amounts) for all leaf nodes. More specifically, the ~~hierarchization relativity~~ hierarchical relativization processing is the processing for determining node output values such that the weighted average of output values corresponding to all childe nodes of an arbitrary node that is not a leaf node is zero and the input value (state amount) of an arbitrary leaf node agrees with the sum of the output value of the node and the output values of all ancestor nodes of the node.

Please replace the paragraph beginning at page 180, line 11, and insert the following rewritten paragraph:

Subsequently, in S58, it is determined whether an estimation enable condition is satisfied, and the mode of each node is finally determined on the basis of the result of the determination and the node request mode. The mode of each node to be determined is one of the aforesaid ready mode, hold mode, and reset ~~node~~

mode. The aforesaid node request mode has been determined on the basis of whether the ground contact portions are in contact with the ground or not on the desired gait. In S58, the mode of each node is determined, considering whether the ground contact portions are actually in contact with the ground or not.

Please replace the paragraph beginning at page 186, line 26, and insert the following rewritten paragraph:

If the determination result of S6402 is YES, then intra-group all estimation processing for a node having two child nodes (the processing for virtually estimating the node relative floor height error of each of the two child nodes owned by the n-th node) is carried out in S6404. In this processing, estimated node relative floor height errors Zi_rel_estm and Zj_rel_estm of the i-th node and the j-th node, respectively, which are the two child nodes of the n-th node, are determined (updated) according to the expressions shown in the flowchart of Fig. 46. More specifically, Zi_rel_estm will be representatively explained. ~~A j-th node~~An i-th node relative floor height error correction amount candidate value Zi_inc_cand determined in the aforesaid S54 is added to a value Zi_rel_estm_p of Zi_rel_estm in the last control cycle thereby to determine a new estimated ~~j-th~~ i-th node relative floor height error Zi_rel_estm. The same applies to the j-th node.

Please replace the paragraph beginning at page 187, line 16, and insert the following rewritten paragraph:

Further, if the resultant force Fn_z of the floor reaction forces of the two child nodes of the n-th node is smaller than the predetermined value Fn_min2 (if the determination result of S6402 is NO), then it means that the accuracy of estimating a floor configuration error would be excessively deteriorated, so that no substantial estimation processing is carried out, and the intra-group all hold processing for a node having two child nodes (the processing for holding the estimated node relative floor height errors of the two child nodes of the n-th node without updating them) is carried out in S6406. In the hold processing, as shown by the expressions in the flowchart of Fig. 48, the values of the estimated node relative floor height errors Zi_rel_estm and ~~Zi_rel_estm~~ Zj_rel_estm of the i-th node and the j-th node, respectively, are maintained at the values Zi_rel_estm_p and ~~Zi_rel_estm_p~~Zj_rel_estm_p of the last control cycle.

Please replace the paragraph beginning at page 188, line 6, and insert the following rewritten paragraph:

Next, if it is determined in S6400 of Fig. 45 that the modes of the two child nodes are "all reset," then intra-group all reset processing for a node having two child nodes (the processing for resetting the estimated node relative floor height error of each of the two child nodes owned by the n-th node) is carried out in S6408. In the reset processing, the estimated node relative floor height errors Zi_rel_estm and ~~Zi_rel_estm~~Zj_rel_estm of the i-th node and the j-th node, respectively, are updated according to the expressions in the flowchart of Fig. 47 such that they gradually approximate zero. Incidentally, the meanings of ΔT and Testm in the

expressions are the same as those of the aforesaid expression 35.

Please replace the paragraph beginning at page 191, line 17, and insert the following rewritten paragraph:

Here, if it is determined that the modes of child nodes are "all ready," then it is determined in S6602 whether a ~~resultant force~~ Fn_z (=Fi_act_z+Fj_act_z+Fk_act_z) resultant force of the translational force vertical components Fi_act_z, Fj_act_z, and Fk_act_z of the actual node floor reaction forces of the child nodes of the n-th node is larger than a predetermined value Fn_min2. In other words, Fn_z denotes the translational force vertical component of the resultant force of the actual floor reaction forces of all ground contact portions belonging to the n-th node.

Please replace the paragraph beginning at page 192, line 19, and insert the following rewritten paragraph:

If the determination result of S6602 is NO, then it means that the accuracy of estimating a floor configuration error would be excessively deteriorated, so that no substantial estimation processing is carried out, and the intra-group all hold processing for a node having three child nodes (the processing for holding the estimated node relative floor height errors of the three child nodes of the n-th node without updating them) is carried out in S6606. In the hold processing, as shown by the expressions in the flowchart of Fig. 52, the values of the estimated node relative floor height errors Zi_rel_estm, Zj_rel_estm, and Zk_rel_estm of the i-th node, the j-

th node, and the k-th node, respectively, are maintained at the values Zi_rel_estm_p, Zj_rel_estm_p, and ~~Zk_rel_estm~~ Zk_rel_estm_p in the last control cycle.

Please replace the paragraph beginning at page 195, line 25, and insert the following rewritten paragraph:

Subsequently, in S66128, Zi_inc_cand', ~~Zj_inc_cand~~Zj_inc_cand', and Zk_inc_cand' determined as described above are added to the values Zi_rel_estm_p, Zj_rel_estm_p, and Zk_rel_estm_p of the relative floor height errors of the i-th node, the j-th node, and the k-th node, respectively, in the last control cycle so as to determine new Zi_rel_estm, Zj_rel_estm, and Zk_rel_estm.

Please replace the paragraph beginning at page 196, line 5, and insert the following rewritten paragraph:

By determining Zi_rel_estm, Zj_rel_estm, and Zk_rel_estm as described above, Zi_rel_estm, ~~Zi_rel_estm~~Zj_rel_estm, and Zk_rel_estm will be determined such that Zj_rel_estm-Zk_rel_estm approximates Zj_inc_cand-Zk_inc_cand while satisfying ~~Wi*Zi_rel_estm+Wj*Zi_rel_estm+Wk+Zk_rel_estm=0~~ Wi*Zi_rel_estm+Wj*Zi_rel_estm+Wk*Zk_rel_estm=0 at the same time.

Please replace the paragraph beginning at page 196, line 17, and insert the following rewritten paragraph:

Further, if it is determined in S6600 of Fig. 49 that the modes of the three child nodes are "only one child node is hold and the remaining ones are reset," then the processing for a case where only one child ~~mode~~ node is hold and the remaining ones are reset is carried out in S6616. In the processing, new node relative floor height errors Zi_rel_estm, Zj_rel_estm, and Zk_rel_estm are determined according to the expressions shown in the flowchart of Fig. 54. Incidentally, in this case, it is assumed that the mode of the i-th node is the hold mode and the modes of the j-th node and the k-th node are the reset mode. The meanings of ΔT and Testm in the expressions are the same as those in the aforesaid expression 35.

Please replace the paragraph beginning at page 197, line 27, and insert the following rewritten paragraph:

Further, if it is determined in S6600 of Fig. 49 that the modes of the child nodes are "only two child nodes are hold and the remaining ones are reset," then the processing for a case where only two child ~~modes~~ nodes are hold and the remaining ones are reset is carried out in S6618. In the processing, new node relative floor height errors Zi_rel_estm, Zj_rel_estm, and Zk_rel_estm are determined according to the expressions shown in the flowchart of Fig. 55. Incidentally, in this case, it is assumed that the modes of the i-th node and the j-th ~~mode~~ node are both the hold mode and the mode of the k-th node is the reset mode. The meanings of ΔT and Testm in the expressions are the same as those in the aforesaid expression 35.

Please replace the paragraph beginning at page 198, line 13, and insert the following rewritten paragraph:

The processing of Fig. 55 is, more generally, the processing for holding Zi_rel_estm and Zj_rel_estm at the values in the last control cycle, and determining Zk_rel_estm to take a value that is closer to zero than Zk_rel_estm_p is, while satisfying Wi*Zi_rel_estm+ Wj*Zj_rel_estm+ Wk*Zk_rel_estm=0 (a condition in which the weighted average value of Zi_rel_estm, Zj_rel_estm and Zk_rel_estm is zero). Supplementally, by the moment the k-th ~~mode~~ node becomes the reset mode, Wk should have become zero.

Please replace the paragraph beginning at page 213, line 4, and insert the following rewritten paragraph:

Further, the aforesaid estimated n-th ground contact portion floor reaction force is subtracted from the detected value of the actual floor reaction force ~~Fnact~~ Fn_act of an n-th ground contact portion (n=1,2,...,last leaf node number) to determine the estimated error of the n-th ground contact portion floor reaction force Ffn_estm_err. The estimated error of the n-th ground contact portion floor reaction force Ffn_estm_err is expressed in terms of a force, so that it is converted into a height error by a conversion value Cn (e.g., the reciprocal of a spring constant) and the result is adopted as an n-th ground contact portion floor height error correction amount candidate value Zfn_inc_cand. Incidentally, the conversion value Cn is not necessarily a diagonal matrix.

Please replace the paragraph beginning at page 230, line 24, and insert the following rewritten paragraph:

In this robot ~~1~~51, in the state wherein the robot ~~1~~51 is kneeling (particular posture state), as shown in Fig. 58 and Fig. 59, the portions of the foot 58 and each knee joint 56 of each leg 52 (more specifically, the surface portion of a link (shank link) connecting the knee joint 56 and the ankle joint 57 at near the knee joint 56. Hereinafter referred to simply as the knee) and the hand 62 of each arm 54 are ground contact portions. And, in the present embodiment, as shown in Fig. 59, the knee, which is a ground contact portion, is provided with a floor reaction force sensor 90 (load sensor) as an external force detecting means. The floor reaction force sensor 90 is constructed of a main body (sensor part) 92 and a soft member (elastic member) 94, such as a sponge. The main body 92 is fixed to the knee (leg link), and the outside of the main body 92 is covered with a soft member (elastic member) 94. To enhance the accuracy of the compliance control in the knee, it is desirable to shape the surface (ground contact surface) of the soft member 94 into a round convex surface in addition to covering the knee with the soft member 94. This arrangement reduces the nonlinearity of the relationship between a corrective operation of a desired motion of the robot 51 and a floor reaction force, resulting in better control performance of the compliance control. Incidentally, although not shown, the foot 58 and the ankle joint 57 are connected through a floor reaction force sensor, such as a six-axis force sensor, and the compliance mechanism. Similarly, the hand 62 and the wrist joint 61 are connected through a floor reaction

force sensor, such as a six-axis force sensor, and the compliance mechanism, which are not shown. The connecting constructions may be ones that are publicly known.

Please replace the paragraph beginning at page 234, line 11, and insert the following rewritten paragraph:

In this case, the desired ground contact portion trajectory of a desired motion in a desired gait output by a gait generating device 100 in the present embodiment is constructed of the desired position/posture trajectory of each hand 62, the desired position/posture trajectory of each foot 58, and the desired position trajectory of each knee. In this case, the gait generating device 100 preferentially determines desired foot positions/postures (desired first and second ground contact portion positions/postures), desired hand positions/postures (desired fifth and sixth ground contact portion positions/postures), and desired knee positions (desired third and fourth ground contact portion positions) so that the feet 58, the hands 62, and the knees come in contact with the ground on a supposed floor surface as required for the gait, then determines a desired ZMP (desired total floor reaction force central point) in a supporting polygon, which is a minimum convex polygon that includes the desired ground contact point (or a desired ground contact line or a desired ground contact surface) of each ground contact portion. Then, desired body position/posture are determined by using a dynamic model of the robot ~~1~~ 51 such that the desired foot positions/postures, the desired hand positions/postures, the desired knee positions, and the desired ZMP are satisfied.

Please replace the paragraph beginning at page 243, line 1, and insert the following rewritten paragraph:

Fig. 64 visually shows an operation for correcting the position and the posture of the body 53 on the basis of changes in the sum of the heights of the right and left knees. Specifically, from the posture of the robot 51 indicated by the dashed lines, as both knees are operated to move down by the compliance control to the posture of the robot 51 indicated by the solid lines, the bottom end portion (or the waist) of the body 53 is shifted forward, as indicated by an arrow y3, and the inclination of the body 53 is shifted backward (in the direction in which the body 53 rises), as indicated by an arrow y2. In other words, the body 53 is tilted ~~backward~~ forward while maintaining the position of the center-of-gravity G of the body 53 (or the position of a predetermined representative point of the body 53), especially the horizontal position thereof. Alternatively, the body 53 is tilted backward while maintaining the inclination of the segment connecting the center-of-gravity G and the desired total floor reaction force central point P. Further, as an operation for raising both knees is performed by the compliance control, the bottom end portion (or the waist) of the body 53 is shifted backward, inversely from the above, to shift the inclination of the body toward the front. In other words, the body 53 is tilted forward while maintaining the position of the center-of-gravity G of the body (or the position of the predetermined representative point of the body), especially its horizontal position. Alternatively, the body 53 is tilted backward while maintaining the inclination of the segment connecting the center-of-gravity G and the desired total floor reaction force central point P. Incidentally, Q1" and Q3" in Fig. 64 denote the desired floor reaction force

central point of the foot 58 and the desired floor reaction force central point of the knee, respectively, after the position/posture of the body 53 have been corrected as described above. In this example, Q1" is identical to a desired floor reaction force central point Q1 of the foot 58 before the correction.

Please replace the paragraph beginning at page 251, line 13, and insert the following rewritten paragraph:

Subsequently, the desired body position/posture are moved (rotational movement and parallel movement) by the body position/posture correction amounts to determine desired body position/posture with twist correction. Specifically, the desired body position/posture are rotationally moved about a trunk axis (or a predetermined axis of rotation (the axis of rotation substantially in a vertical plane)) by the sum of the body posture correction amount for knee height difference and the body posture correction amount for foot height difference (θbkneediffmdfd + θbfootdiffmdfd), and this is further rotationally moved about a lateral axis by the body posture correction amount for the sum of knee heights ~~θbfootsummdfd~~ <u>θbkneesummdfd</u>, then this is further moved in parallel in the longitudinal direction of the robot 51 by the sum of the body position correction amount for knee height difference, the body position correction amount for the sum of knee heights, and the body position correction amount for foot height difference (Xbkneediffmdfd + Xbkneesummdfd + Xbfootdiffmdfd) thereby to determine desired body position/posture with twist correction.

Please replace the paragraph beginning at page 258, line 26, and insert the following rewritten paragraph:

Subsequently, joint displacement correction amounts are determined according to expressions 53 to 56 given below, where θknee_r denotes a right knee joint displacement correction amount, θknee_l denotes a left knee joint displacement correction amount, θhip_r denotes a right hip joint displacement correction amount (more specifically, the joint displacement correction amount in the pitch direction of the right hip joint), and θhip_l denotes a left hip joint displacement correction amount (more specifically, the joint displacement correction amount in the pitch direction of the ~~right~~ left hip joint).

Please replace the paragraph beginning at page 263, line 5, and insert the following rewritten paragraph:

Fig. ~~70~~ 69 shows the construction of an essential section of a robot according to the present embodiment. This robot 71 is provided with floor reaction force sensors 73 and 73 for detecting floor reaction forces (load sensors, such as six-axis force sensors) at the right and left, respectively, of the base end surface of buttocks 72. Instead of providing the floor reaction force sensors 73 and 73 at the right and left, a single floor reaction force sensor that detects the resultant force of the forces applied to the right and left of the base end surface of the buttocks 72 may be provided.

Please replace the paragraph beginning at page 264, line 9, and insert the following rewritten paragraph:

In the robot 71, legs (link mechanisms) 52~~ and 55~~ are provided extendedly from the right and left sides of the buttocks 72. The structures of the legs ~~55 and 55~~52, including their joints, are the same as those of, for example, the aforesaid first embodiment. Hence, the same reference marks as those related to the legs ~~5 and 55~~ 52 in the first embodiment will be used, and the explanations thereof will be omitted. However, in the present embodiment, the knees of the legs ~~55~~ 52 may not be provided with floor reaction force sensors.

Please replace the paragraph beginning at page 266, line 26, and insert the following rewritten paragraph:

In the present embodiment, a hierarchical compliance operation determiner 114 has the same functional components as those of the aforesaid second embodiment (refer to Fig. 62). However, in the present embodiment, a compensating total floor reaction force moment distributor determines and outputs the node compensating floor reaction force moments of the intermediate nodes and the root node in the hierarchical structure shown in Fig. 70 and the node compensating floor reaction force moments of the leaf nodes corresponding to the feet 58. Further, a compensating angle determiner determines and outputs the node compensating angles of the intermediate nodes and the root node in the hierarchical structure shown in Fig. 70 and the node compensating angles of the leaf nodes

corresponding to the feet 58. In this case, the basic techniques for determining these node compensating floor reaction force moments and node compensating angles may be the same as the techniques explained in the first to the third reference examples or the first embodiment. Further, a floor configuration estimator determines estimated n-th floor height errors Zfn_estm(n=1,2,3,4) by the same technique as the technique explained in the aforesaid third ~~embodiment~~ reference example, as in the case of the aforesaid first embodiment, and also estimates ground contact portion floor inclination errors θfn(n=1,2) of the feet 58.

Please replace the paragraph beginning at page 270, line 24, and insert the following rewritten paragraph:

For example, in the aforesaid ~~sixth~~ first embodiment, if no floor reaction force sensors for detecting knee floor reaction forces are provided or floor reaction force sensors for detecting knee floor reaction forces fail, then an estimated 34th node floor reaction force is determined according to the following expression 59.

Please replace the paragraph beginning at page 271, line 4, and insert the following rewritten paragraph:

Estimated 34th node floor reaction force

= (Overall center-of-gravity acceleration of desired gait + ~~Center-of-gravity~~gravitational acceleration) * Total mass

- Actual non-34th node floor reaction forces

= Overall center-of-gravity acceleration of desired gait * Total mass

- (Actual 12th node floor reaction force + Actual 56th node floor reaction force) ... Expression 59